

CASE NO.: HSJ920030169US1
Serial No.: 10/629,675
June 30, 2006
Page 2

PATENT
Filed: July 29, 2003

1. (previously presented) A hard disk drive, comprising:
 - at least one storage disk;
 - at least one drive controller reading data from and writing data to the disk, the drive controller executing logic comprising:
 - executing a scrub cycle including:
 - reading at least one data unit;
 - determining whether an error exists in the data unit, and if so, undertaking at least one of: recording the error, or reporting the error;
 - executing the reading and determining logic for subsequent data units;
 - if a user request for at least one of: a data read, or a data write, is received, interrupting the scrub cycle to fulfill the request, and then waiting a delay period after fulfilling all user requests in a user request queue prior to resuming the scrub cycle, wherein the delay period is an adaptive delay period that depends on at least one of: a frequency, or a number, of user requests received from the RAID controller.

2. (original) The disk drive of Claim 1, in combination with a RAID system, wherein the user request is received by the drive controller from a RAID controller.

3, 4. (canceled).

1189-12.AM1

CASE NO.: HSJ920030169US1
Serial No.: 10/629,675
June 30, 2006
Page 3

PATENT
Filed: July 29, 2003

5. (original) The disk drive of Claim 1, wherein the disk drive is partitioned into data bands, the drive controller maintaining a table indicating at least recent accesses to bands.

6. (original) The disk drive of Claim 1, comprising executing the scrub cycle on data immediately adjacent on the disk to data that is subject to a user request, as part of fulfilling the request.

7. (original) The disk drive of Claim 1, comprising executing the scrub cycle on first data that has been written more recently than second data, and then scrubbing the second data.

8. (original) The disk drive of Claim 1, comprising executing the scrub cycle on areas of the disk that have been more frequently accessed than other, less frequently used areas, and then scrubbing the less frequently used areas.

9. (previously presented) A hard disk drive, comprising:

at least one storage disk;

at least one drive controller reading data from and writing data to the disk, the drive controller executing logic comprising:

executing a scrub cycle including:

reading at least one data unit;

determining whether an error exists in the data unit, and if so, undertaking at least one of: recording the error, or reporting the error;

1189-12.AM1

CASE NO.: HSI920030169US1
Serial No.: 10/629,675
June 30, 2006
Page 4

PATENT
Filed: July 29, 2003

executing the reading and determining logic for subsequent data units;

if a user request for at least one: a data read, or a data write, is received, and if a current scrub rate exceeds a threshold rate, interrupting the scrub cycle to fulfill the request, and then resuming the scrub cycle, and otherwise not interrupting at least an existing scrub read of the scrub cycle.

10. (original) The disk drive of Claim 9, in combination with a RAID system, wherein the user request is received by the drive controller from a RAID controller.

11. (original) The disk drive of Claim 10, comprising waiting a delay period after fulfilling all user requests in a user request queue prior to resuming the scrub cycle.

12. (previously presented) The disk drive of Claim 11, wherein the delay period is an adaptive delay period that depends on at least one of: a frequency, or a number, of user requests received from the RAID controller.

13. (original) The disk drive of Claim 9, wherein the disk drive is partitioned into data bands, the drive controller maintaining a table indicating at least recent accesses to bands.

14. (original) The disk drive of Claim 9, comprising executing the scrub cycle on data immediately adjacent on the disk to data that is subject to a user request as part of fulfilling the request.

1189-12.AM1

CASE NO.: HSI920030169US1
Serial No.: 10/629,675
June 30, 2006
Page 5

PATENT
Filed: July 29, 2003

15. (original) The disk drive of Claim 9, comprising executing the scrub cycle on first data that has been written more recently than second data, and then scrubbing the second data.

16. (original) The disk drive of Claim 9, comprising executing the scrub cycle on areas of the disk that have been more frequently accessed than other, less frequently used areas, and then scrubbing the less frequently used areas.

17. (previously presented) A hard disk drive, comprising:

at least one storage disk;

at least one drive controller reading data from and writing data to the disk, the drive controller executing logic comprising:

executing a scrub cycle including:

reading at least one data unit;

determining whether an error exists in the data unit, and if so, undertaking at least one of: recording the error, or reporting the error;

executing the reading and determining logic for subsequent data units, wherein the scrub cycle is executed on first data that has been written more recently than second data, and then is executed on the second data, wherein if a user request for at least one: a data read, or a data write, is received, and if a current scrub rate exceeds a threshold rate, interrupting the scrub cycle to fulfill the request, and then resuming the scrub cycle, and otherwise not interrupting at least an existing scrub read of the scrub cycle.

1189-12.AM1

CASE NO.: HSJ920030169US1
Serial No.: 10/629,675
June 30, 2006
Page 6

PATENT
Filed: July 29, 2003

18. (previously presented) The hard disk drive of Claim 17, wherein if a user request for at least one of: a data read, or a data write, is received, interrupting the scrub cycle to fulfill the request, and then resuming the scrub cycle.

19. (original) The disk drive of Claim 18, in combination with a RAID system, wherein the user request is received by the drive controller from a RAID controller.

20. (canceled).

21. (currently amended) A hard disk drive, comprising:

at least one storage disk;

at least one drive controller reading data from and writing data to the disk, the drive controller executing logic comprising:

executing a scrub cycle including:

receiving a user data request;

expanding the request to include one or more adjacent data scrub units;

scrubbing the data scrub unit while servicing the request; and

determining whether an error exists in the data scrub unit, and if so, undertaking at least one of: recording the error, or reporting the error, wherein if a user request for at least one of: a data read, or a data write, is received, and if a current scrub rate exceeds a

1189-12.AM1

CASE NO.: HSJ920030169US1
Serial No.: 10/629,675
June 30, 2006
Page 7

PATENT
Filed: July 29, 2003

threshold rate, interrupting the scrub cycle to fulfill the request, and then resuming the scrub cycle, and otherwise not interrupting at least an existing scrub read of the scrub cycle

22. (previously presented) The hard disk drive of Claim 21, wherein if a user request for at least one of: a data read, or a data write, is received, interrupting the scrub cycle to fulfill the request, and then resuming the scrub cycle.

23. (original) The disk drive of Claim 22, in combination with a RAID system, wherein the user request is received by the drive controller from a RAID controller.

24. (canceled).

25. (previously presented) A hard disk drive, comprising:

at least one storage disk;

at least one drive controller reading data from and writing data to the disk, the drive controller executing logic comprising:

executing a scrub cycle including:

reading at least one data unit;

determining whether an error exists in the data unit, and if so, undertaking at least one of: recording the error, or reporting the error;

1189-12.AM1

CASE NO.: HSI920030169US1

Serial No.: 10/629,675

June 30, 2006

Page 8

PATENT

Filed: July 29, 2003

executing the reading and determining logic for subsequent data units, wherein the scrub cycle is executed on areas of the disk that have been more frequently accessed than other, less frequently used areas, and then is executed on the less frequently used areas, wherein if a user request for at least one: a data read, and a data write, is received, and if a current scrub rate exceeds a threshold rate, interrupting the scrub cycle to fulfill the request, and then resuming the scrub cycle, and otherwise not interrupting at least an existing scrub read of the scrub cycle.

26. (previously presented) The hard disk drive of Claim 25, wherein if a user request for at least one of: a data read, or a data write, is received, interrupting the scrub cycle to fulfill the request, and then resuming the scrub cycle.

27. (original) The disk drive of Claim 26, in combination with a RAID system, wherein the user request is received by the drive controller from a RAID controller.

28. (canceled).

29. (canceled).

1189-12.AM1